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Docket No.: 4544-011-25 DIV

ASSISTANT COMMISSIONER FOR PATENTS  
WASHINGTON, D.C. 20231

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APR 10 1997

GROUP 3300

RE: Application Serial No. 08/420,503  
Applicant(s): MICHAEL D. QUINN ET AL  
Filing Date: APRIL 12, 1995  
For: THERMODILUTION CATHETER HAVING A SAFE,  
FLEXIBLE HEATING ELEMENT  
Group No. 3311  
Examiner: NASSER

SIR:

Attached hereto for filing are the following papers:

PETITION TO GRANT THE 37 CFR 1.607 REQUEST  
WITH ONE ATTACHMENT

Our check in the amount of \$130.00 is attached covering any required fees. In the event any variance exists between the amount enclosed and the Patent Office charges for filing the above-noted documents, including any fees required under 37 CFR 1.136 for any necessary Extension of Time to make the filing of the attached documents timely, please charge or credit the difference to our Deposit Account No. 15-0030. Further, if these papers are not considered timely filed, then a petition is hereby made under 37 C.F.R. 1.136 for the necessary extension of time. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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44-011-25 DIV

130-122

3311  
#28

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF: :

MICHAEL D. QUINN ET AL. : GROUP ART UNIT: 3311

SERIAL NO. 08/420,503 :

FILED: APRIL 12, 1995 : EXAMINER: NASSER

FOR: THERMODILUTION CATHETER  
HAVING A SAFE, FLEXIBLE  
HEATING ELEMENT

RECEIVED

APR 10 1997

GROUP 3300

PETITION TO GRANT THE 37 CFR 1.607 REQUEST

**I. RELIEF REQUESTED**

Applicants request that their outstanding 37 CFR 1.607 request for an interference with United States patent No. 5,435,308 to Gallup et al. (hereinafter referred to as "the Gallup et al." patent) be granted. Specifically, the applicants request (1) that the examiner fill out the initial interference memorandum and (2) that the examiner transfer this application and the application from which the Gallup et al. patent matured to the Board for the declaration of an interference.

**II. MATERIAL FACTS**

(1) The Gallup et al. patent issued on July 25, 1995.

290 TL 04/02/97 08420503

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(2) The Gallup et al. patent matured from application serial No. 914,279 (hereinafter referred to as "the '279 application"), filed July 16, 1992.

(3) The present application was filed on April 12, 1995.

(4) The present application is a divisional of United States application serial No. 08/049,231 (hereinafter referred to as "the '231 application"), filed April 19, 1993.

(5) The '231 application is a continuation of United States application serial No. 07/647,578 (hereinafter referred to as "the '578 application"), filed January 29, 1991.

(6) On April 12, 1995, the applicants filed a 37 CFR 1.604 request for an interference with the '279 application and/or any continuation or divisional of the '279 application.

(7) On August 30, 1995, shortly after the issuance of the Gallop et al. patent, the applicants filed a 37 CFR 1.607 request for an interference with the Gallop et al. patent.

(8) On February 15, 1996, the USPTO mailed a non-final first office action in the present application (1) that denied applicants' 37 CFR 1.607 request, (2) that

rejected claims under the first and second paragraphs of 35 USC 112, and (3) that indicated that claims 45-58 defined over the art of record. The February 15, 1996 office action did not reject any of the then pending claims based upon prior art, but called the applicants' attention to "Willis in view of Khalil and Grise."<sup>1</sup>

(9) Examiner Nasser filled out an examiner summary record on April 16, 1996 stating:

Discussed language to overcome the 112 rejections. Discussed amendments to claims to provoke interference. The Examiner indicated that applicant did not have support the [sic for] the location of the port distal to the heating element. The examiner indicated that further consideration is required to determine whether such difference defines a separate patentable invention under 37 C.F.R. §1.601(n) [and] indicated Claims 46-52 are free of the art.

(10) On May 15, 1996, the applicants filed an amendment and an updated 37 CFR 1.607 request for an interference with the Gallop et al. patent.

(11) On September 04, 1996, a final office action was issued (1) that denied the request for the interference, (2) that rejected claims 45, 53-58, and 61-63 based upon combinations involving United States patent No. 4,718,423 to Willis et al. (hereinafter referred to as "the Willis et

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<sup>1</sup>Office Action page 6 lines 1-2.

al. patent") and United States patent No. 4,217,910 to Khalil (hereinafter referred to as "the Khalil '910 patent"), (3) that indicated claims 46-52 were allowable, and (4) that indicated that claims 59 and 60 would be allowable if rewritten to overcome 35 USC 112 rejections.

(12) In the September 04, 1996 office action, the examiner stated that:

The examiner notes that during prosecution of the Gallup et al patent, claims 1-6 were rejected over Moran (4,776,340) in view of Khalil (4,217,910), while claim 7, which was the location of the pressure port between the distal end of the catheter and the heating element, was indicated to define over the art. The examiner further notes that Moran, the base reference, had a port. Therefore, the location of the port was the patentable feature. Accordingly, it is the examiner's conclusion that the claims of the Gallup et al patent, which define the location of the port, are patentably distinct, as defined by 37 C.F.R. § 1.601, from the present claims. Accordingly, the interference has not been set up by the examiner.<sup>2</sup>

The location of the port that was the patentable feature referred to by the examiner is defined in claim 1 in the Gallup et al. patent as:

a distal thermal pressure port disposed between the distal end of the heater coil and the distal end of the catheter....

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<sup>2</sup>Office action page 2 lines 8-20; emphasis supplied.

(13) On December 16, 1996, the applicants filed a request for reconsideration of the denial of the 37 CFR 1.607 request. That request explained that, assuming arguendo that it would have been obvious to modify the Willis et al. patent's catheter in view of the Khalil '910 patent to provide the combination posited by the examiner, the subject matter defined by the claims in the Gallup et al. patent would have been obvious in view of either (1) the combination involving the Willis et al. patent and the Khalil '910 patent or (2) that combination in further view of the subject matter defined by the claims in the present application. The primary rationale for the request for reconsideration was that the examiner's posited combination (over which the claims of this application were rejected) had a port responding to the distal thermal pressure port defined by claim 1 in the Gallup et al. patent. That port is the port P/M' shown in Figure 1 in the Willis et al. patent. The Willis et al. patent discloses that the port P/M' can be used to measure pressure at column 7 lines 3-10. Figure 1 shows that the port P/M' for measuring pressure is distal the port P' for injecting bolus (heated liquid). The posited combination replaces the port P' with the heater coil element taught by the Khalil '910 patent --

which results in a catheter having the port P/M' being "between the distal end of the heater coil and the distal end of the catheter."

(14) On February 04, 1997, the applicants filed an amendment amending claims to define subject matter that distinguished over the combination posited in the September 04, 1996 office action based upon the Willis et al. patent in view of the Khalil '910 patent. The February 04, 1997 amendment addressed all of the issues raised in the September 04, 1996 office action.

(15) On February 05, 1997, a non-final office action was issued (in response to the December 16, 1996 request for reconsideration of the 37 CFR 1.607 request) which (1) repeated all of the grounds for rejecting the claims present in the September 04, 1996 office action and (2) rejected the claims that were either indicated to be allowed or to contain allowable subject matter in the September 04, 1996 office action (i.e., claims 46-52, 59, and 60) as obvious based upon the Willis et al. patent in view of the Khalil '910 patent.<sup>3</sup>

(16) The rationale for the rejection of (previously allowable) claims 46-52, 59, and 60 based upon the combination of the Willis et al. patent in view of the

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<sup>3</sup>Office action page 5 lines 1-13 and 17-21.

Khalil '910 patent in the February 05, 1997 office action reads as follows:

Claim 46 is rejected in that in addition [to] the features of the invention discussed above, Willis et al shows the port P' on a "necked down" portion of the catheter. Claim 47 is rejected in that the necked down portion includes a portion of the catheter that is 14-15 centimeters from the distal end of the device. Claim 48 is rejected in that the heater is a coil wrapped about the necked down portion. Claim 49 is rejected in that there is a thermistor distal to the heater in the combination. Claims 50-52 are rejected in that the coil of the combination has center to center spacings such that adjacent turns do not contact each other, has an outer sheath and the diameter of the coil approximates that of the catheter when wrapped about the catheter. Claim 53 is rejected in that the port P/M' is distal to the interface. Claim 54 is rejected in that the exact distance between the end of the catheter and the heater varies with catheter size and would have been obvious to one skilled in the art. Claims 56-58 and 61-63 are rejected in that the combination shows all of the features of the claims. Claim 59 and 60 are rejected in that there is a fluid injectate lumen and port P/M' for injecting a fluid into the blood, that is distal to the interface.<sup>4</sup>

(17) The teachings in the Willis et al. patent relative to the port P' are (1) the port P' shown in Figure 1, (2) the passage in the specification of the Willis et al. patent at column 7 lines 33-44, and (3) the passage in

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<sup>4</sup>Office action page 5 lines 1-21.



the specification of the Willis et al. patent at column 8 lines 17-23.

(18) Figure 1 in the Willis et al patent does not show the port P' on a necked-down portion of the catheter.<sup>5</sup>

(19) The passage in the specification of the Willis et al. patent at column 7 lines 33-44 reads as follows:

Twenty-eight to thirty centimeters proximal to the tip 102 of the catheter 101, another aperture P' is formed in the catheter wall, communicating with the lumen P. In use this proximal aperture P' is typically positioned within the patient's right atrium, and is used for injection of a cold bolus in the thermodilution method of cardiac output (flow rate) measurement. This same aperture P' can also be used to measure pressures.

(20) The passage in the specification of the Willis et al. patent at column 8 lines 17-23 reads as follows:

Also among the termination devices 107 are two other hubs 115 and 116. Of these, one port 115 communicates with the proximal lumen P, for injection of a cold bolus in thermodilution cardiac-capacity tests. The other port 116 connects with the pacing-and-medication lumen P/M to guide the coaxial pacing wire 139 (and drip medication) to the right ventricle.

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<sup>5</sup>See pages 1073 and 1074 of the second edition of the "Dictionary of Scientific and Technical Terms " which evidence definitions for "neck", "neck-down", "necking", and "necking down," copies of the title page, copyright page, and pages 1073 and 1074 of the dictionary are attachment 1 to this petition.

(21) The specification of the Willis et al. patent does not disclose the port P' on a necked-down portion of the catheter. The Khalil '910 patent does not disclose a necked-down portion. Claims 45-60 and 64 define a necked-down portion for the heater element. Therefore, the posited combination is not subject matter defined by claims 45-60 and 64.

(22) The Willis et al. patent discloses that the aperture P' is 28 to 30 centimeters from the tip of the catheter 101. Therefore, assuming arguendo that the Khalil '910 patent motivates replacing the port P' with a heater coil (as posited by the examiner), that heater coil would not be 14 to 15 centimeters from the distal end of the catheter. Therefore, neither the Willis et al. patent nor the Khalil '910 patent provide teachings suggesting a heater coil (1) that is wrapped about a necked-down portion of the catheter and (2) that is 14 to 15 centimeters from the distal end of the catheter, as is defined by claims 47 and 54. Therefore, the posited combination is not subject matter defined by claims 47 and 54.

(23) Neither the Willis et al. patent nor the Khalil '910 patent suggests an outer sheath and a coil having a diameter that approximates the diameter of the catheter

when the outer sheath and the coil are wrapped about the necked-down portion of the catheter, as is defined by claim 52. Therefore, the posited combination is not subject matter defined by claim 52.

(24) Neither the Willis et al. patent nor the Khalil '910 patent suggests a multilumen multipurpose cardiac catheter in which wiring extends in one of the lumens and fiber optic filaments extend in a different one of the lumens, as is defined by claims 61-63. Therefore, the posited combination is not subject matter defined by claims 61-63.

(25) Neither the Willis et al. patent nor the Khalil '910 patent disclose or suggest a multilumen, multipurpose cardiac catheter in which an injectate lumen has surfaces defining a port, and the port is positioned along the multilumen main body portion such that, when the distal tip of the main body portion is in a pulmonary artery of a patient, the port is in the right atrium or the superior vena cava of the heart of the patient, as is defined by claim 64. Therefore, the posited combination is not subject matter defined by claim 64.

### III. REASONS WHY THE PETITION SHOULD BE GRANTED

For the reasons presented hereinbelow, the claims in this application are allowable and define the same patentable invention as the subject matter defined by the claims in the Gallup et al. patent within the meaning of 37 CFR 1.601(n).

The examiner has stated on the record in this application that the location of the port between the heater element and the distal tip of the catheter defined by the claims in the Gallup et al. patent is "the patentable feature" of those claims. That is, the examiner in this application believes that the claims in the '279 application were allowed because of the location of the pressure port between (1) the heater element and (2) the distal tip of the catheter. The applicant believes that the examiner's conclusion regarding the '279 application is correct.

Moreover, the reason the examiner presented in the September 04, 1996 office action for denying the applicants' request for the interference was because the applicants' claims did not define the location of the port

between the heater element and the distal tip of the catheter.<sup>6</sup>

The September 04, 1996 and February 05, 1997 office actions in this application assert that the modification of the Willis et al. patent replacing the bolus heating port P' with the heater element disclosed in the Khalil '910 patent would have been obvious. That combination replaces the bolus heating port P' in the Willis et al. patent with the heater coil disclosed in the Khalil '910 patent. That combinational structure also has the port P/M' between the heater coil and the distal tip of the catheter. The Willis et al. patent discloses that the port P/M' can be used for pressure measurement in the right ventricle.<sup>7</sup> Since the port P/M' (1) is distal the heater, and (2) is for measuring pressure, the port P/M' responds to the distal thermal pressure port recited in claim 1 in the Gallup et al. patent. Thus, assuming arguendo the combination posited in the last two office actions against the claims in this application, it would follow that the subject matter defined by the claims in the Gallup et al. patent would have been obvious based upon the prior art and the subject matter defined by the claims in this application.

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<sup>6</sup>Office action page 2 lines 3-8.

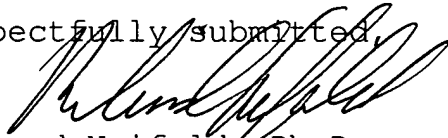
<sup>7</sup>Column 7 lines 6-7.

Moreover, the subject matter defined by the claims in this application is allowable over the prior art for the reasons presented hereinabove in paragraphs (22) - (25). Thus, the claims in this application define the same patentable invention as the subject matter defined by the claims in the Gallup et al. patent within the meaning of 37 CFR 1.601(n). Therefore, the necessary and sufficient conditions for the declaration of an interference between the Gallup et al. patent and this application exist. 37 CFR 1.606.

#### IV. CONCLUSION

The petition should be granted.

Respectfully submitted,



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ATTACHMENT 1

**McGraw-Hill**  
**DICTIONARY OF**  
**SCIENTIFIC AND**  
**TECHNICAL**  
**TERMS** Second Edition



Included in this Dictionary are definitions which have been published previously in the following works: P. B. Jordain. *Condensed Computer Encyclopedia*, Copyright © 1969 by McGraw-Hill, Inc. All rights reserved. J. Markus. *Electronics and Nucleonics Dictionary*, 4th ed., Copyright © 1960, 1966, 1978 by McGraw-Hill, Inc. All rights reserved. J. Quick. *Artists' and Illustrators' Encyclopedia*, Copyright © 1969 by McGraw-Hill, Inc. All rights reserved. *Blakiston's Gould Medical Dictionary*, 3d ed., Copyright © 1956, 1972 by McGraw-Hill, Inc. All rights reserved. T. Baumeister and L. S. Marks, eds., *Standard Handbook for Mechanical Engineers*, 7th ed., Copyright © 1958, 1967 by McGraw-Hill, Inc. All rights reserved.

In addition, material has been drawn from the following references: R. E. Huschke. *Glossary of Meteorology*, American Meteorological Society, 1959; U.S. Air Force *Glossary of Standardized Terms*, AF Manual 11-1, vol. 1, 1972; *Communications-Electronics Terminology*, AF Manual 11-1, vol. 3, 1970; W. H. Allen, ed., *Dictionary of Technical Terms for Aerospace Use*, 1st ed., National Aeronautics and Space Administration, 1965; J. M. Gilliland, *Solar-Terrestrial Physics: A Glossary of Terms and Abbreviations*, Royal Aircraft Establishment Technical Report 67158, 1967; *Glossary of Air Traffic Control Terms*, Federal Aviation Agency; *A Glossary of Range Terminology*, White Sands Missile Range, New Mexico, National Bureau of Standards, AD 467-424; *A DOD Glossary of Mapping, Charting and Geodetic Terms*, 1st ed., Department of Defense, 1967; P. W. Thrush, comp. and ed., *A Dictionary of Mining, Mineral, and Related Terms*, Bureau of Mines, 1968; *Nuclear Terms: A Glossary*, 2d ed., Atomic Energy Commission; F. Casey, ed., *Compilation of Terms in Information Sciences Technology*, Federal Council for Science and Technology, 1970; *Glossary of Stinfo Terminology*, Office of Aerospace Research, U.S. Air Force, 1963; *Naval Dictionary of Electronic, Technical, and Imperative Terms*, Bureau of Naval Personnel, 1962; *ADP Glossary*, Department of the Navy, NAVSO P-3097.

**McGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS**  
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ISBN 0-07-045258-X

target distance is determined by moving an adjustable pedestal signal along the base line until it coincides with the horizontal position of the blips; the pedestal control is calibrated in distance.

**NDRO** See nondestructive readout.

**Ne** See neon.

**neatotype** [SYST] A type specimen that, compared with the holotype, is of the opposite sex, and was collected and described later.

**Neanderthal man** [PALEON] A type of fossil human that is a subspecies of *Homo sapiens* and is distinguished by a low broad braincase, continuous arched browridges, projecting occipital region, short limbs, and large joints.

**neap high water** See mean high-water neaps.

**neap low water** See mean low-water neaps.

**neap range** [OCEANOGR] The mean semidiurnal range of tide when neap tides are occurring; the mean difference in height between neap high water and neap low water. Also known as mean neap range.

**neap rise** [OCEANOGR] The height of neap high water above the chart datum.

**neaps** See neap tide.

**neap tidal currents** [OCEANOGR] Tidal currents of decreased speed occurring at the time of neap tides.

**neap tide** [OCEANOGR] Tide of decreased range occurring about every 2 weeks when the moon is in quadrature, that is, during its first and last quarter. Also known as neaps.

**Nearctic fauna** [ECOL] The indigenous animal communities of the Nearctic zoogeographic region.

**Nearctic zoogeographic region** [ECOL] The zoogeographic region that includes all of North America to the edge of the Mexican Plateau.

**near-end crosstalk** [COMMUN] A type of interference that may occur at carrier telephone repeater stations when output signals of one repeater leak into the same end of the other repeater.

**nearest approach** [NAV] The least distance between two objects having relative motion with respect to each other.

**nearest neighbors** [CRYSTAL] Any pair of atoms in a crystal lattice which are as close to each other, or closer to each other, than any other pair.

**near field** [ACOUS] The acoustic radiation field that is close to an acoustic source such as a loudspeaker. [ELECTROMAG] The electromagnetic field that exists within one wavelength of a source of electromagnetic radiation, such as a transmitting antenna.

**near-infrared radiation** [ELECTROMAG] Infrared radiation having a relatively short wavelength, between 0.75 and about 2.5 micrometers (some scientists place the upper limit from 1.5 to 3 micrometers), at which radiation can be detected by photoelectric cells, and which corresponds in frequency range to the lower electronic energy levels of molecules and semiconductors. Also known as photoelectric infrared radiation.

**near-infrared spectrophotometry** [ANALY CHEM] Spectrophotometry at wavelengths in the near-infrared region, generally using instruments with quartz prisms in the monochromators and lead sulfide photoconductor cells as detectors to observe absorption bands which are harmonics of bands at longer wavelengths.

**near miss** [ORD] The strike of an explosive missile, especially of an aerial bomb, near but not on the object of attack, and usually close enough to cause effective damage.

**near point** [PHYSIO] The smallest distance from the eye at which a small object can be seen without blurring.

**nearshore circulation** [OCEANOGR] Ocean circulation consisting of both the nearshore currents and the coastal currents.

**nearsightedness** See myopia.

**near stars** [ASTRON] Those stars in the celestial neighborhood of the sun, sometimes taken as those 22 stars within 13 light-years of the sun.

**nearthrosis** [MED] A type of nonunion of broken ends of bones in which a cystic space resembling a joint cavity develops between poorly joined ends.

**near-ultraviolet radiation** [ELECTROMAG] Ultraviolet radi-

ation having relatively long wavelength, in the approximate range from 300 to 400 nanometers.

**near wilt** [PL PATH] A fungus disease of peas caused by *Fusarium oxysporum* *fst*; affects scattered plants and develops more slowly than true wilt.

**neat cement grout** [MATER] Grout made from a mixture of cement and water.

**neat line** [CIV ENG] The line to which a masonry wall should generally conform. [MAP] That border line which indicates the limits of an area shown on a map or chart.

**neat plaster** [MATER] A base-coat plaster, having sand added at the job location.

**neatsfoot oil** [MATER] Pale-yellow oil with unusual odor; soluble in organic solvents and kerosine; obtained by boiling shinbones and hoofless feet of cattle; used to treat leather, as a lubricant, and to oil wool. Also known as bubulum oil; hoof oil.

**neat soap** [MATER] Soap in the molten state formed during manufacture, especially after fitting and settling out of nigre and lye.

**Nebellacea** [INV ZOO] A small, marine order of Crustacea in the subclass Leptostraca distinguished by a large bivalve shell, without a definite hinge line, an anterior articulated rostrum, eight thoracic and seven abdominal somites, a pair of articulated furcal rami, and the telson.

**Nebraskan drift** [GEOL] Rock material transported during the Nebraskan glaciation; it is buried below the Kansan drift in Iowa.

**Nebraskan glaciation** [GEOL] The first glacial stage of the Pleistocene epoch in North America, beginning about 1,000,000 years ago, and preceding the Aftonian interglacial stage.

**nebula** [ASTRON] Interstellar clouds of gas or small particles; an example is the Horsehead Nebula in Orion.

**nebular hypothesis** [ASTROPHYS] A theory, proposed in 1796 by Laplace, supposing that the planets originated from the solar nebula surrounding the proto-sun; as the sun cooled, it contracted, rotated faster, and thus caused a ringlike bulging at the equator; this bulge eventually broke off and formed the planets; Laplace further theorized that the sun and other stars formed from clouds of nebulous matter; the theory in this form is not accepted.

**nebular lines** [ASTROPHYS] The spectral lines formed in the glow of bright nebulae; they arise from forbidden atomic transition which can take place because of the very low pressure in the nebula itself.

**nebular red shift** [ASTROPHYS] A systematic shift observed in the spectra of all distant galaxies; the wavelength shift toward the red increases with the distance of the galaxies from the earth.

**nebular transitions** [ASTROPHYS] Those electronic transitions for doubly ionized argon and chlorine that yield the nebular lines seen in the spectra of gaseous nebulae.

**nebular variable** See T Tauri star.

**nebulite** [PETR] A chondrite in which one of the textural elements occurs in nebulitic lenticular masses.

**nebulite** [PETR] 1. Having indistinct boundaries between textural elements. 2. Of or pertaining to a nebulite.

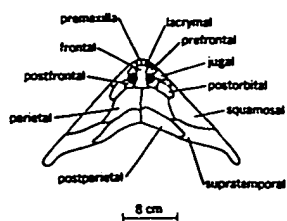
**nebulosus** [METEOROL] A cloud species with the appearance of a nebulous veil, showing no distinct details; found principally in the genera cirrostratus and stratus.

**neburon** [ORG CHEM]  $C_{12}H_{16}Cl_2N_2O$  A white, crystalline compound with a melting point of 102-103°C; used as an herbicide to control weeds in nursery ornamentals, dichondras, and wheat. Also known as 1-n-butyl-3-(3,4-dichlorophenyl)-1-methylurea.

**necessary bandwidth** [COMMUN] For a given class of emission, the minimum value of the occupied bandwidth sufficient to ensure the transmission of information at the rate and with the quality required for the system employed, under specified conditions.

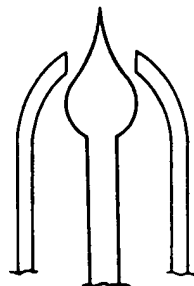
**neck** [ANAT] The usually constricted communicating column between the head and trunk of the vertebrate body. [ENG] The part of a furnace where the flame is contracted before reaching the stack. [GEOGR] A narrow strip of land, especially one connecting two larger areas. [GEOL] 1. A vertical, pipelike intrusion representing the formed vent of a volcano. 2. See pipe. [MET] In a tensile test, that portion of

## NECTRIDEA



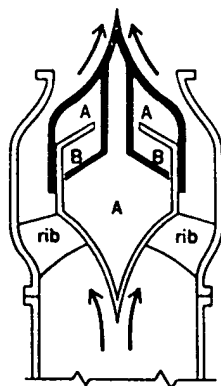
Skull of a lower Permian nectridian, *Diplocaulus*. (From E. H. Colbert, *Evolution of the Vertebrates*, 2d ed., copyright © 1969 by John Wiley & Sons, Inc.; reprinted by permission)

## NEEDLE NOZZLE



Needle nozzle, the movement of the needle (in the center) backward and forward changes the size of the jet.

## NEEDLE VALVE



Large needle valve is actuated hydraulically by pressure in chambers A to close and in annular chambers B to open.

the metal at which fracture is imminent during the later stages of plastic deformation in a tensile test. [OCEANOGR] The narrow band of water forming the part of a rip current where feeder currents converge and flow swiftly through the incoming breakers and out to the head.

**neck breadth** (ANTHRO) The diameter of the neck measured halfway between the otobasion inferior and the shoulder.

**neck depth** (ANTHRO) The diameter of the neck between the tip of the thyroid cartilage and the back of the neck, measured perpendicular to the axis of the neck, with contact only.

**neck-down** (MET) 1. A thin core used for restricting the riser neck; facilitates cutting off the riser from the casting. 2. Localized area reduction of a test piece during plastic deformation.

**Neckeraceae** (BOT) A family of mosses in the order Isobryales distinguished by undulate leaves.

**neck-in** (ENG) When coating by extrusion, the width difference between the extruded web leaving the die and that of the coating on the surface.

**necking** (MET) Reducing the diameter or cross-sectional area of a tube or other piece of metal by stretching.

**necking down** (MET) Localized reduction in cross-sectional area of a specimen during tensile deformation.

**neck rot** (PL PATH) A fungus disease of onions caused by species of *Botrytis* and characterized by rotting of the leaves just above the bulb.

**necr-, necro-** (MED) Combining form denoting death.

**necrobiosis** (MED) Death of a cell or group of cells under either normal or pathologic conditions.

**Necrolestidae** (PALEON) An extinct family of insectivorous marsupials.

**necrophagous** (ZOO) Feeding on dead bodies.

**necrophilia** (PSYCH) A person affected with necrophilia.

**necrophilia** (PSYCH) 1. Longing for death. 2. See necrophilism.

**necrophillism** (PSYCH) Also known as necrophilia. 1. Unnatural obsession with and usually erotic attraction for dead bodies. 2. Sexual violation of a corpse.

**necrophobia** (PSYCH) Abnormal dread of death and of dead bodies.

**necropsy** (MED) To perform an autopsy.

**necrosis** (MED) Death of a cell or group of cells as a result of injury, disease, or other pathologic state.

**necrotic** (MED) Pertaining to, causing, or undergoing necrosis.

**necrotic enteritis** (VET MED) A bacterial infection of young swine caused by *Salmonella suispestifer* or *S. choleraesuis* and characterized by fever and necrotic and ulcerative inflammation of the intestine.

**necrotic ring spot** (PL PATH) A virus leaf spot of cherries marked by small, dark water-soaked rings which may drop out, giving the leaf a tattered appearance.

**necrotize** (MED) To undergo necrosis; to become necrotic.

**necrozoospermia** (MED) A condition in which spermatozoa are immobile.

**nectar** (BOT) A sugar-containing liquid secretion of the nectaries of many flowers.

**nectarine** (BOT) A smooth-skinned, fuzzless fruit originating as a spontaneous somatic mutation of the peach, *Prunus persica* and *P. persica* var. *nectarina*.

**nectary** (BOT) A secretory organ or surface modification of a floral organ in many flowers, occurring on the receptacle, in and around ovaries, on stamens, or on the perianth; secretes nectar.

**nectocalyx** (INV ZOO) A swimming bell of a siphonophore. Also known as nectophore.

**Nectonematodea** (INV ZOO) A monogeneric order of worms belonging to the class Nematomorpha, characterized by dorsal and ventral epidermal chords, a pseudocoel, and dorsal and ventral rows of bristles; adults are parasites of true crabs and hermit crabs.

**nectophore** See nectocalyx.

**nectosome** (INV ZOO) The part of a complex siphonophore that bears swimming bells.

**Nectridea** (PALEON) An order of extinct lepospondylous amphibians characterized by vertebrae in which large fan-

shaped hemal arches grow directly downward from the middle of each caudal centrum.

**Nectrioidaceae** (MYCOL) The equivalent name for Zythiaceae.

**Necturus** (VERT ZOO) A genus of mud puppies in the family Proteidae.

**need** (PSYCH) An acquired or physiological lack or deficit within the individual.

**need complementarity** (PSYCH) The concept that people having different needs like each other because they provide each other with mutual satisfaction of opposed needs.

**needle** (ADP) A slender rod or probe used to sort decks of edge-punched cards by inserting it through holes along the margin of the deck and vibrating the deck so that cards having that particular hole are retained, but those having a notch cut at that hole position drop out. [BOT] A slender-pointed leaf, as of the firs and other evergreens. [DES ENG] 1. A device made of steel pointed at one end with a hole at the other; used for sewing. 2. A device made of steel with a hook at one end; used for knitting. [ENG] 1. A piece of copper or brass about 1/2 inch (13 millimeters) in diameter and 3 or 4 feet (90 or 120 centimeters) long, pointed at one end, thrust into a charge of blasting powder in a borehole and then withdrawn, leaving a hole for the priming, fuse, or squib. Also known as pricker. 2. A thin pointed indicator on an instrument dial. [ENO ACOUS] See stylus.

**needlebar** (TEXT) A bar for mounting needles on a sewing or knitting machine.

**needle beam** (CIV ENG) A temporary member thrust under a building or a foundation for use in underpinning.

**needle bearing** (DES ENG) A roller-type bearing with long rollers of small diameter; the rollers are retained in a flanged cup, have no retainer, and bear directly on the shaft.

**needle blow** (ENG) A blow-molding technique in which air is injected into the plastic article through a hollow needle inserted in the parison.

**needle board** (TEXT) A board that holds needles in a loom.

**needle dam** (CIV ENG) A barrier made of horizontal bars across a pass through a dam or of planks that can be removed in case of flooding.

**needle file** (DES ENG) A small file with an extended tang that serves as a needle.

**needle gap** (ELECTR) Spark gap in which the electrodes are needle points.

**needle ice** See frazil ice.

**needle nozzle** (MECH ENG) A streamlined hydraulic turbine nozzle with a movable element for converting the pressure and kinetic energy in the pipe leading from the reservoir to the turbine into a smooth jet of variable diameter and discharge but practically constant velocity.

**needle ore** See aikinite.

**needle scratch** See surface noise.

**needle test point** (ELEC) A sharp steel probe connected to a test cord for making contact with a conductor.

**needle tubing** (ENG) Stainless steel tubing with outside diameters from 0.014 to 0.203 inch (0.36 to 5.16 millimeters); used for surgical instruments and radon implanters.

**needle valve** (DES ENG) A slender, pointed rod fitting in a hole or circular or conoidal seat; used in hydraulic turbines and hydroelectric systems.

**needle weir** (CIV ENG) A type of frame weir in which the wooden barrier is constructed of vertical square-section timbers placed side by side against the iron frames.

**needling** (CIV ENG) Underpinning the upper part of a building with horizontally placed timber or steel beams.

**need-to-know** (ORD) A criterion used in security procedures in the United States that requires a person requesting classified information to establish the need to know such information in terms of the pertinent mission.

**Néel ferromagnetism** See ferrimagnetism.

**Néel point** See Néel temperature.

**Néel's theory** (SOLID STATE) A theory of the behavior of antiferromagnetic and other ferrimagnetic materials in which the crystal lattice is divided into two or more sublattices; each atom in one sublattice responds to the magnetic field generated by nearest neighbors in other sublattices, with the result that magnetic moments of all the atoms in any sublattice are